

**CSA C22.2 No. 108:14**

*(reaffirmed 2024)*



# Liquid pumps



# Legal Notice for Standards

Canadian Standards Association (operating as “CSA Group”) develops standards through a consensus standards development process approved by the Standards Council of Canada. This process brings together volunteers representing varied viewpoints and interests to achieve consensus and develop a standard. Although CSA Group administers the process and establishes rules to promote fairness in achieving consensus, it does not independently test, evaluate, or verify the content of standards.

## Disclaimer and exclusion of liability

This document is provided without any representations, warranties, or conditions of any kind, express or implied, including, without limitation, implied warranties or conditions concerning this document’s fitness for a particular purpose or use, its merchantability, or its non-infringement of any third party’s intellectual property rights. CSA Group does not warrant the accuracy, completeness, or currency of any of the information published in this document. CSA Group makes no representations or warranties regarding this document’s compliance with any applicable statute, rule, or regulation.

IN NO EVENT SHALL CSA GROUP, ITS VOLUNTEERS, MEMBERS, SUBSIDIARIES, OR AFFILIATED COMPANIES, OR THEIR EMPLOYEES, DIRECTORS, OR OFFICERS, BE LIABLE FOR ANY DIRECT, INDIRECT, OR INCIDENTAL DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES, HOWSOEVER CAUSED, INCLUDING BUT NOT LIMITED TO SPECIAL OR CONSEQUENTIAL DAMAGES, LOST REVENUE, BUSINESS INTERRUPTION, LOST OR DAMAGED DATA, OR ANY OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER BASED IN CONTRACT, TORT (INCLUDING NEGLIGENCE), OR ANY OTHER THEORY OF LIABILITY, ARISING OUT OF OR RESULTING FROM ACCESS TO OR POSSESSION OR USE OF THIS DOCUMENT, EVEN IF CSA GROUP HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES.

In publishing and making this document available, CSA Group is not undertaking to render professional or other services for or on behalf of any person or entity or to perform any duty owed by any person or entity to another person or entity. The information in this document is directed to those who have the appropriate degree of experience to use and apply its contents, and CSA Group accepts no responsibility whatsoever arising in any way from any and all use of or reliance on the information contained in this document.

CSA Group is a private not-for-profit company that publishes voluntary standards and related documents. CSA Group has no power, nor does it undertake, to enforce compliance with the contents of the standards or other documents it publishes.

## Intellectual property rights and ownership

As between CSA Group and the users of this document (whether it be in printed or electronic form), CSA Group is the owner, or the authorized licensee, of all works contained herein that are protected by copyright, all trade-marks (except as otherwise noted to the contrary), and all inventions and trade secrets that may be contained in this document, whether or not such inventions and trade secrets are protected by patents and applications for patents. Without limitation, the unauthorized use, modification, copying, or disclosure of this document may violate laws that protect CSA Group’s and/or others’ intellectual property and may give rise to a right in CSA Group and/or others to seek legal redress for such use, modification, copying, or disclosure. To the extent permitted by licence or by law, CSA Group reserves all intellectual property rights in this document.

## Patent rights

Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. CSA Group shall not be held responsible for identifying any or all such patent rights. Users of this standard are expressly advised that determination of the validity of any such patent rights is entirely their own responsibility.

## Authorized use of this document

This document is being provided by CSA Group for informational and non-commercial use only. The user of this document is authorized to do only the following:

If this document is in electronic form:

- load this document onto a computer for the sole purpose of reviewing it;
- search and browse this document; and
- print this document if it is in PDF format.

Limited copies of this document in print or paper form may be distributed only to persons who are authorized by CSA Group to have such copies, and only if this Legal Notice appears on each such copy.

In addition, users may not and may not permit others to

- alter this document in any way or remove this Legal Notice from the attached standard;
- sell this document without authorization from CSA Group; or
- make an electronic copy of this document.

If you do not agree with any of the terms and conditions contained in this Legal Notice, you may not load or use this document or make any copies of the contents hereof, and if you do make such copies, you are required to destroy them immediately. Use of this document constitutes your acceptance of the terms and conditions of this Legal Notice.



# ***Standards Update Service***

***CSA C22.2 No. 108:14***  
***June 2014***

**Title:** *Liquid pumps*

To register for e-mail notification about any updates to this publication

- go to [www.csagroup.org/store/](http://www.csagroup.org/store/)
- click on **CSA Update Service**

The **List ID** that you will need to register for updates to this publication is **2422855**.

If you require assistance, please e-mail [techsupport@csagroup.org](mailto:techsupport@csagroup.org) or call 416-747-2233.

Visit CSA Group's policy on privacy at [www.csagroup.org/legal](http://www.csagroup.org/legal) to find out how we protect your personal information.

*CSA C22.2 No. 108:14*

***Liquid pumps***



*®A trademark of the Canadian Standards Association, operating as "CSA Group"*

*Published in June 2014 by CSA Group  
A not-for-profit private sector organization  
178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3*

*To purchase standards and related publications, visit our Online Store at  
[www.csagroup.org/store/](http://www.csagroup.org/store/) or call toll-free 1-800-463-6727 or 416-747-4044.*

*ISBN 978-1-77139-444-4*

*© 2014 Canadian Standards Association  
All rights reserved. No part of this publication may be reproduced in any form whatsoever  
without the prior permission of the publisher.*

# Contents

Technical Committee on Industrial Products	4
Subcommittee on Liquid Pumps	7
Preface	8
<b>1 Scope</b>	<b>10</b>
<b>2 Reference publications</b>	<b>11</b>
<b>3 Definitions</b>	<b>12</b>
<b>4 General requirements</b>	<b>13</b>
<b>5 Construction</b>	<b>13</b>
5.1 General	13
5.2 Enclosures	14
5.2.1 General	14
5.2.2 Enclosures for the electrical equipment of pumps	14
5.3 Protection against corrosion	14
5.4 Guards	14
5.5 Gaskets, bushings, and seals	15
5.6 Connection to the power supply	15
5.6.1 Permanently installed pumps	15
5.6.2 Cord-connected and cord- and plug-connected pumps	15
5.6.3 Component type pumps	16
5.7 Terminal parts and leads	16
5.7.1 General	16
5.7.2 Terminal boxes	16
5.7.3 Electrical spacings	16
5.8 Wiring	17
5.9 Motors	17
5.10 Motor control devices, switches, and overload protection	17
5.11 Bonding	18
5.12 Pumps supplied without motors	18
<b>6 Marking</b>	<b>18</b>
<b>7 Tests</b>	<b>20</b>
7.1 General	20
7.2 Test conditions	20
7.3 Rated current	20
7.4 Starting (cord-connected pumps)	21
7.5 Temperature (normal)	21
7.6 Dielectric strength	22
7.7 Water tests for special purpose enclosures	22
7.8 Leakage current	23

7.9	Accelerated aging (gaskets)	24
7.10	Strain relief	25
7.11	Guards	25
7.12	Pumps with starting windings	25
7.13	Flame tests	25
7.14	Impact (nonmetallic enclosures)	26
<b>8</b>	<b>Submersible pumps</b>	<b>26</b>
8.1	Scope	26
8.2	Construction	26
8.2.1	Connection to the supply	26
8.2.2	Bonding	27
8.3	Marking	27
8.4	Tests	29
8.4.1	Test Conditions	29
8.4.2	Temperature (normal)	29
8.4.3	Water tests for special purpose enclosures	30
8.4.4	Leakage current (decorative fountain pumps)	30
8.4.5	Abnormal (cord- and plug-connected pumps)	30
8.4.6	Supply conductors and cords (submersible oil-filled motors)	31
<b>9</b>	<b>Cord- and plug-connected poolside pumps</b>	<b>31</b>
9.1	Scope	31
9.2	Construction	32
9.2.1	General	32
9.2.2	Enclosures	32
9.2.3	Cords and plugs	32
9.2.4	Motors	33
9.2.5	Controls and switches	33
9.2.6	Electrical spacings	33
9.2.7	Insulating materials	34
9.2.8	Bonding	34
9.3	Marking	35
9.4	Tests	35
9.4.1	General	35
9.4.2	Dielectric strength	36
9.4.3	Leakage current	36
9.4.4	Water tests for enclosures	36
9.4.5	Moisture absorption (insulating materials)	37
9.4.6	Physical abuse	37
9.4.7	Stability	37
9.4.8	Strain relief	38
<b>10</b>	<b>Insulated wet end pumps</b>	<b>38</b>
10.1	Scope	38
10.2	Construction	38
10.2.1	General	38
10.2.2	Connection to the supply	38
10.2.3	Motors	38
10.2.4	Shaft seals	38

10.3	Marking	39
10.4	Tests	39
10.4.1	General	39
10.4.2	Dielectric strength	39
10.4.3	Leakage current	39
10.4.4	Shaft seal water leakage	40
<b>11</b>	<b>Extra-low-voltage recreational vehicle pumps</b>	<b>40</b>
11.1	Scope	40
11.2	Construction	41
11.2.1	General	41
11.2.2	Connection to the supply	41
11.2.3	Overheating protection	41
11.2.4	Bonding	41
11.3	Marking	41
11.4	Temperature (normal) test	42
<b>12</b>	<b>Pool and spa cover drain pumps</b>	<b>42</b>
12.1	Scope	42
12.2	Construction	42
12.2.1	Ground fault current interrupt	42
12.2.2	Bonding	43
12.2.3	Cords	43
12.3	Marking	43
12.4	Tests	43
12.4.1	General	43
12.4.2	Current flowing in the equipment bonding conductor	43
12.4.3	Leakage current	44
12.4.4	Strain relief	44
12.4.5	Impact	44
12.4.6	Mould stress relief	45
12.4.7	Abnormal test	45
<b>13</b>	<b>Aquarium pumps</b>	<b>45</b>
13.1	Scope	45
13.2	Construction	45
13.2.1	Attachment plug	45
13.2.2	Power supply cords	45
13.2.3	Accessible metal parts	46
13.3	Tests	46
13.3.1	General	46
13.3.2	Dielectric strength	46
13.3.3	Leakage current	46
13.3.4	Insulation test	46

---

Annex A (informative)	— Factory (production line) dielectric strength tests for poolside pumps and insulated wet end pumps	54
-----------------------	--	----

# ***Technical Committee on Industrial Products***

<b>R.M. Bartholomew</b>	Electric Power Equipment Ltd., Vancouver, British Columbia <i>Representing Producer Interest</i>	<i>Chair</i>
<b>R.P. de Lhorbe</b>	Schneider Electric Canada, Inc., Richmond, British Columbia <i>Representing Producer Interest</i>	<i>Vice-Chair</i>
<b>D.P. Badry</b>	Government of Yukon, Whitehorse, Yukon Territory <i>Representing Government and/or Regulatory Authority</i>	
<b>B. Baldwin</b>	Startco Engineering ULC, Saskatoon, Saskatchewan	<i>Associate</i>
<b>W.J. Bryans</b>	Electro-Federation Canada, Toronto, Ontario	<i>Associate</i>
<b>R.B. Buckler</b>	ASCO Power Technologies Canada, Brantford, Ontario	<i>Associate</i>
<b>W.J. Burr</b>	Burr and Associates, Campbell River, British Columbia	<i>Associate</i>
<b>F. Chan</b>	Schneider Electric Canada, Inc., Mississauga, Ontario	<i>Associate</i>
<b>P.D. den Bakker</b>	Shell Global Solutions Canada, Calgary, Alberta	<i>Associate</i>
<b>S.W. Douglas</b>	International Association of Electrical Inspectors, Toronto, Ontario	<i>Associate</i>
<b>J.H. Dymond</b>	Peterborough, Ontario	<i>Associate</i>
<b>V.V. Gagachev</b>	Eaton, Burlington, Ontario	<i>Associate</i>



<b>R.J. Kelly</b>	Government of Nunavut-Dept of Community & Government Services, Iqaluit, Nunavut	<i>Associate</i>
<b>A. Leslie</b>	Curtiss Wright Controls, Integrated Sensing, Stratford, Ontario	<i>Associate</i>
<b>D.R. MacLeod</b>	Department of Labour and Advanced Education, Halifax, Nova Scotia <i>Representing Government and/or Regulatory Authority</i>	
<b>N. Mancini</b>	Mississauga, Ontario <i>Representing General Interest</i>	
<b>D. Mascarenhas</b>	Brampton, Ontario <i>Representing General Interest</i>	
<b>A. Milne</b>	21st Olympiad Sales, Burlington, Ontario	<i>Associate</i>
<b>D.G. Morlidge</b>	Fluor Canada Ltd., Calgary, Alberta <i>Representing General Interest</i>	
<b>T. Olechna</b>	Electrical Safety Authority, Mississauga, Ontario <i>Representing Government and/or Regulatory Authority</i>	
<b>R. Pack</b>	SaskPower, Saskatoon, Saskatchewan <i>Representing Government and/or Regulatory Authority</i>	
<b>V. Rowe</b>	Marex Canada Limited, Nanaimo, British Columbia	<i>Associate</i>
<b>M. Smith</b>	Rockwell Automation Canada Inc. Control Systems, Cambridge, Ontario <i>Representing Producer Interest</i>	
<b>C. Thwaites</b>	Mersen Canada Toronto Inc., Mississauga, Ontario	<i>Associate</i>

**A.Z. Tsisserev**

Stantec Consulting Ltd.,  
Vancouver, British Columbia  
*Representing General Interest*

**D. Stefancic**

CSA Group,  
Mississauga, Ontario

*Project Manager*

# ***Subcommittee on Liquid Pumps***

<b>S.H. Fediw</b>	Gorman-Rupp of Canada Limited, St. Thomas, Ontario	<i>Chair</i>
<b>J.P. Boivin</b>	CSA Group, Pointe-Claire, Québec	
<b>G.C. Brooke</b>	Franklin Electric Co., Inc., Oklahoma City, Oklahoma, USA	
<b>C. Chapman</b>	Gorman-Rupp of Canada Limited, St. Thomas, Ontario	
<b>E.R. Kovacs</b>	F.E. Myers Company Division of Pentair Canada Inc., Kitchener, Ontario	
<b>M.P. Kowalak</b>	Crane Pumps & Systems, Inc., Piqua, Ohio, USA	
<b>M.J. Michalek</b>	Pentair Water Group, Delavan, Wisconsin, USA	
<b>J.G. Waterman</b>	Liberty Pumps, Inc., Bergen, New York, USA	
<b>J.M. Wilds</b>	Wayne Water Systems a Div of the Scott Fetzer Company, Harrison, Ohio, USA	
<b>G. Zwarych</b>	CSA Group, Toronto, Ontario	
<b>A. Hawley</b>	CSA Group, Mississauga, Ontario	<i>Project Manager</i>

# Preface

This is the fifth edition of CSA C22.2 No. 108, *Liquid pumps*, one of a series of Standards issued by CSA Group under Part II of the *Canadian Electrical Code*. It supersedes previous editions, published in 2001, 1989, 1975, and 1957.

Significant changes to this edition include the addition of Clause [13](#) for aquarium pumps, which incorporates TIL. No. O-21 into the Standard, clarification of bonding in Clause [5.11](#), and reorganization to current editorial standards. In addition, referenced Standards have been updated.

For general information about the Standards of the *Canadian Electrical Code, Part II*, see the Preface of CSA C22.2 No. 0, *General Requirements — Canadian Electrical Code, Part II*.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

This Standard was prepared by a Subcommittee on Liquid Pumps, under the jurisdiction of the Technical Committee on Industrial Products and the Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the Technical Committee.

**Interpretations:** The Strategic Steering Committee on Requirements for Electrical Safety has provided the following direction for the interpretation of standards under its jurisdiction: “The literal text shall be used in judging compliance of products with the safety requirements of this Standard. When the literal text cannot be applied to the product, such as for new materials or construction, and when a relevant committee interpretation has not already been published, CSA’s procedures for interpretation shall be followed to determine the intended safety principle.”

## Notes:

- 1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
- 2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
- 3) *This Standard was developed by consensus, which is defined by CSA Policy governing standardization — Code of good practice for standardization as “substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity”. It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*
- 4) *To submit a request for interpretation of this Standard, please send the following information to [inquiries@csagroup.org](mailto:inquiries@csagroup.org) and include “Request for interpretation” in the subject line:*
  - a) *define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;*
  - b) *provide an explanation of circumstances surrounding the actual field condition; and*
  - c) *where possible, phrase the request in such a way that a specific “yes” or “no” answer will address the issue.*

*Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization and are available on the Current Standards Activities page at [standardsactivities.csagroup.org](http://standardsactivities.csagroup.org).*
- 5) *This Standard is subject to review within five years from the date of publication and suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to [inquiries@csagroup.org](mailto:inquiries@csagroup.org) and include “Proposal for change” in the subject line:*
  - a) *Standard designation (number);*
  - b) *relevant clause, table, and/or figure number;*
  - c) *wording of the proposed change; and*